Notice of References Cited	Application/Control No. 10/551,460	Applicant(s)/Patent Under Reexamination MATSUDO, MASAKI	
	Examiner leszek b. kiliman	Art Unit 1773	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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TITLE

LAMINATED STRUCTURES WITH SUPERIOR IMPACT RESISTANCE AND PROCESS FOR MAKING SAME

This application claims the benefit of U.S. Provisional Application No. 60/381,494, filed May 16, 2002.

BACKGROUND OF THE INVENTION

Plasticized polyvinyl butyral sheet (PVB) is used in the manufacture of laminate structures such as, for example: windshields for vehicles including automobiles, motorcycles, boats and airplanes; homes and buildings; shelving in cabinets and display cases; and other articles where structural strength and laminate stability is desirable in a glass sheet. For the purposes of the present application, laminate stability refers to the ability of glass to remain adhered to PVB and/or the ability of the laminate layers to remain substantially together under harsh or even extreme circumstances. In some special applications, superior impact resistance and laminate stability is required, or highly preferable. For example, it can be preferred that laminates used in homes and other buildings withstand the harsh conditions prevalent in hurricanes, tornadoes, and/or severe wind storms.

A wide variety of glass laminates formed with PVB are known and described in U.S. Patent 4,297,262; U.S. Patent 4,230,771; and, British Patent 828,381. Typically, PVB is plasticized to have low stiffness and deform readily upon impact -- which is an excellent property for automotive windshields wherein human impact is involved and passenger retention in a crash, and hence, reduction in fatality is desired. However, these are not the properties required for architectural

windows exposed to high stresses, nor for side windows for automobiles and trucks that may be subjected to criminal actions. The properties of low stiffness and high elasticity limit performance when the laminate must provide intrusion resistance after the glass of the laminate has broken; for example, when a glass laminate is subjected to high wind load, and/or impact of flying debris as occurs in a hurricane, or where there is repeated impact to a window by a criminal attempting to break into a vehicle or structure. Conventional PVB laminates such as windshields or standard architectural laminated glass perform poorly in tests designed to evaluate the performance of a laminate under hurricane conditions, such as the Dade County, FL hurricane window system test protocol wherein there is a severe impact test followed by a pressure cycling test conducted on the shattered laminate.

Conventional PVB laminates can eventually fail in a hurricane when they are subjected to pressure loading and cycling. Failure can be due to either the large deformation of the polymer interlayer which can cause the laminate to pull out of the window frame, and/or due to the action of shards of broken glass which eventually cut into the PVB layer and allow air pressure or other threat to permeate the structure that the laminate is intended to protect. Conventional laminates can also be penetrated more readily with instruments used by a criminal attempting to gain entry through the laminate. The use of layers of PVB that are thicker than the standard laminate to gain more stiffness and cut-through resistance is impractical due to cost and the excessive thickness of the interlayer required. Similarly, the use of stiffer PVB of conventional thickness is difficult because the stiff